FORM 7/24, 7/18, 25/02

Department of Patents.
Patents Act 1903-1921.
Commonwealth of Australia.

No. 10,430/22.

APPLICATION DATED

22nd December, 1922.

Applicant (Actual Inventor)	JAMES D'ARCY.
Application and Provisional Specification ...	Lodged 22nd December, 1922.
Application and Provisional Specification ...	Accepted 19th February 1923.
Complete Specification	Lodged 8th October, 1923.
Complete Specification Accepted 21*st Dec.*, 1923	Acceptance Advertised (Sec. 50) 8 Jan., 1924.

Class 66.5.

Drawing attached.

COMPLETE SPECIFICATION.

"Improvements in spray type carburetters."

I, JAMES D'ARCY, 3 Cooper Street, Double Bay, near Sydney, New South Wales, Australia, Civil Servant, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:—

This invention relates to spray type carburetters for producing combustible vapor mixture for operating internal combustion engines. The novel features involved in the structure are chiefly the following:—

1. The spray nipple, instead of being screwed into a seating in the base of the mixing chamber as is usual, is formed with a tapered base which is ground to fit a cone seating in a boss on a hollow bridge in the bottom end of the carburetter body below the mixing chamber, and the nipple is held tightly up in this seating by a spring which is carried in a cap which is detachably latched to the nipple foot. Liquid fuel is supplied to the nipple through a passage in the bridge. The nipple is thus readily removable and replaceable for the clearing of obstructions in the orifice and for interchange for another nipple differently calibrated.

2. The nipple orifice is located centrally in the aperture of an iris diaphragm which is adjustable to vary the throat area through which air draft passes the nipple orifice; the entering air entrains fuel from the nipple orifice and carries it into the mixing chamber in an atomised condition.

3. The mixing chamber is fitted with a "Venturi" throat having a ring of small apertures around its flare leading from an annular pocket between the Venturi throat and the wall of the mixing chamber; this pocket is connected into a humidifying chamber. Air charged with water vapor from said chamber is drawn into the Venturi throat at a rate dependent on the velocity of the induction draft. The humidifying chamber is a metal box with a passage through the lower part of it. This passage is connected in the water circulation circuit of the radiator. The connection between the humidifying chamber and the Venturi throat is valved.

In the accompanying drawings:—

Fig. 1 illustrates in longitudinal vertical section the structural features of the carburetter;

Fig. 2 is a top plan above the fuel entrainment control iris diaphragm; and

Fig. 3 is a fragmentary section illustrating the detail of the control mechanism of the iris diaphragm.

C.315.—17/1/24.—75.—Price, 1s. post free.

The fuel supply line is connected at 10 to the hollow collar 11. A cap 12 is screwed up into the tubular base 40 of the fuel level control chamber 14 to carry the collar 11, said collar is held in position on the cap 12 by the nut 13. Liquid fuel flows through the collar 11 into the fuel level control chamber 14. The chamber 14 may be fitted with any conventional type of float control device for maintaining an uniform level of liquid fuel in it, or it may be formed as an atmospheric lock chamber as shown, a float control being then unnecessary. An air pipe to the top of a vacuum lift or gravity supply fuel tank is connected into the top end of the lock tube 15. That tube is formed with an angular bottom end; it extends down into the chamber 14 so that the highest point of its orifice is about the level at which the liquid fuel is required to be maintained for satisfactory operation of the carburetter, that is to say more or less below the level of the nipple orifice. 16 is a "U" pipe, open at one end to atmosphere at 17 and at the other end brought up to near the top of the fuel level control chamber 14. 18 is a cored passage leading from said chamber 14 into the nipple seating 19 which is formed in a boss 26 in a bridge across the bottom end of the nipple chamber 29. This seating 19 is bored conical and accommodates the conical base 20 of the nipple 21. A cap 22 detachably and loosely held by the stub screw 41 on the nipple base by a nut 42 carries a helical spring 23 which bears up against the bottom of the nipple 21 and forces the nipple tightly in the cone seating 19. A passage 24 around the nipple coned base is connected into the nipple bore through one or more transverse holes 25; it permits flow of liquid fuel from the passage 18 into the bore of the nipple. The nipple orifice 27 is centrally located in the nipple chamber 29 axially below the Venturi throat 30, on a level with or slightly above the aperture of an iris diaphragm 28. The iris diaphragm is controllable to vary the area of the aperture around the head of the nipple. The bottom of the nipple chamber 29 is open to atmosphere at either side of the boss 26 and the bridge which carries said boss. 30 is a "Venturi" throat. It is a close fit at its ends in the barrel of the mixing chamber 31. 39 is the fixing flange by which the carburetter is connected to the induction manifold of an engine.

The iris diaphragm 28 is adjustable by means of an operating arm 37 which extends through a lateral slot 38 in the wall of its casing.

It is necessary that there must be an appropriate calibration of the dimensions of the nipple orifice 27 and an appropriate adjustment of the air aperture in the iris diaphragm in relation to the cross-sectional area of the mixing chamber, and also the valve 51 in the humidifying air pipe 33 must be correctly set in order to ensure production of satisfactory working mixtures.

32 is an annular chamber between the Venturi throat 30 and the wall of the mixing chamber 31. The Venturi throat is pierced with a ring of small holes 43 above its constriction, through which holes the chamber 32 is in communication with the flare of the Venturi throat and the mixing chamber 31 above it. 33 is a pipe connecting the annular chamber 32 with the air space in the upper part of the humidifying chamber 34. 35 is an air funnel with wire gauze lid 36, fitted in the top of the humidifier chamber 34. 45 is a cord passage across the bottom of the humidifier chamber 34; it is in the water circulation circuit of the radiator. 46 is a valve seating which is screwed into the top wall of the passage 45 and 47 is a cone shaped valve co-acting with said seating for controlling the passage of hot water from the radiator circuit upward into the humidifier chamber 34. 48 is a float and 49 a guide spindle working through a central hole in the float 48 and passing through a bearing 50 in the top of the chamber 34 and carrying the valve 47 on its bottom end. 52 is a stop on the guide spindle 49. 51 is a valve by which the rate of flow of humidified air to the mixing chamber 31 is adjusted. 44 is the driving throttle. It is preferably a valve of the "butterfly" type controlled by linkage connections from a control lever accessible to the driver.

Density of the working mixture is controlled by aperture area of the iris diaphragm 28 and the setting of the humidified air valve 51 having regard to the degree of opening of the driving throttle 44 for the time being. The iris diaphragm 28 and the humidifier valve 51 are set on test with each particular engine. An appropriately calibrated nipple is fitted in a carburetter having a mixing chamber of appropriate cross sectional area. The iris diaphragm is then adjusted to give satisfactory "idling"

running of the engine, and the humidifier valve 51 is opened up to the maximum desirable point whilst the engine is running under high power. These two adjustments thereafter remain unchanged for that engine, the throttle valve being the only movable element used in the driving. It is connected up to a hand lever and accelerator pedal in the usual way.

It is admitted that the controllable introduction of diluting air into a carburetter through perforations in the walls of a mixing chamber or in the walls of a Venturi is well known, and further that the bringing of humidified air into the mixing chamber of a carburetter is also well known.

In operation liquid fuel is supplied to the level control chamber 14 and rises in that chamber to a predetermined point more or less below the horizontal level of the nipple orifice 27. The level is controlled either by the atmospheric lock device illustrated, which does not form part of the present invention, or by means of a control float device such as is commonly used in carburetters. The fuel flows by gravity through the cored passage 18 to the nipple. When there is atmospheric depression above the driving throttle 44 and the said throttle is opened more or less, an updraft of air is produced in the nipple chamber 29 and as the velocity rises in the Venturi throat 30 a proportionate indraft of humidified air is induced through the perforations 43 in the Venturi throat. The entrainment action of the former draft on the nipple is dependent on the extent of opening of the iris diaphragm 28; when that diaphragm is contracted to a small opening a relatively intense draft (having regard to the manifold depression) is concentrated on the nipple and the rate of delivery of liquid fuel therefrom is high; contrariwise, as the iris is opened the velocity of the entrainment draft is proportionately diminished and less fuel is drawn from the nipple. The degree of dilution with humidified air is proportional to the degree of opening of the valve 51 and dependent also on the degree of depression in the mixing chamber. By appropriate relative settings of the iris valve 28 and the humidified air valve 51 any desired density of mixture and variation in humidification within extreme limits is obtainable. The humidifying chamber may be omitted and the valve 51 arranged to draw atmospheric air direct when humidification is not desired.

Indraft from the humidifier chamber 34 through the pipe 33 causes inflow of atmospheric air through the funnel 35; that air passing over the hot water in the humidifier chamber takes up water vapor, which it carries into the Venturi throat 30. Water vaporised is replenished by water admitted from the radiator circuit by means of the float controlled valve 47. The water in the humidifier chamber is kept hot by the circulating water in the radiator circuit which is constantly flowing through the passage 45.

The iris diaphragm disposes the inflowing draft of air symmetrically round the nipple and procures effective atomisation of the liquid fuel and ensures uniformity in density of the mixture for each particular adjustment of the controls. Co-actively with the air control into the Venturi throat by means of the valve 51, it enables precise adjustment of the carburetter to the demands of each particular engine so that a desirable working mixture is obtained under all operating conditions.

In practice the nipple and the mixing chamber are disposed vertically, but it is to be understood that the structural design of the carburetter may be modified to allow of the mixing chamber being disposed horizontally.

Having now fully described and ascertained my said invention and the manner in which it is to be performed, I declare that what I claim is:—

1. A jet carburetter having a throttle valve above a Venturi throat, a fuel nipple below said Venturi throat, air admission vents in the flare of the Venturi throat, means for controlling the rate of flow of air to said vents, and an adjustable iris diaphragm, the aperture of which is concentrically disposed about the top end of the fuel nipple.

2. A jet carburetter in which the setting adjustments are effected by means of an iris diaphragm the aperture of which symmetrically surrounds the nipple head, and by means of valve controlled air vents in the flare of a Venturi throat which is located between the nipple and the driving throttle.

3. A jet carburetter having the base of its nipple coned and fitted into a coned seating through which fuel is supplied to it, the said nipple base being held in said seating by a helical spring contained in a cap which is detachably engageable in a pocket in the carburetter body by means of a bayonet latch.

4. A jet carburetter having the vents leading to the mixing chamber connected to an air humidifying chamber which is heated by radiator water circulation and is replenished with water taken from said circulation through a float controlled valve.

5. A jet carburetter comprising in combination a vertically disposed cylindrical chamber having a nipple axially located in the lower part of it and carried at its foot in a coned seating, an iris diaphragm at or below the nipple orifice, a Venturi throat above said diaphragm, lateral holes in the flare of the Venturi throat and a valved passageway to said holes, a driving throttle valve above the Venturi throat, means for supplying liquid fuel to the nipple, and controls for the air valve, the iris diaphragm, and the driving throttle.

Dated this 5th day of October, A.D. 1923.

JAMES D'ARCY,
By his Patent Attorney,
W. J. SPRUSON.

Witness—M. Murray.

Printed and Published for the DEPARTMENT OF PATENTS, COMMONWEALTH OF AUSTRALIA, by ALBERT J. MULLETT, Government Printer for the State of Victoria.

22 Dec., 1922. AUSTRALIA No. 10,430/22.

JAMES D'ARCY.

Spray Carburetor.

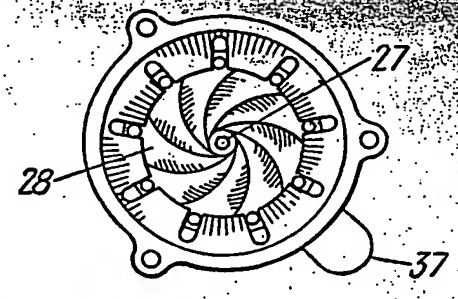

Fig. 2

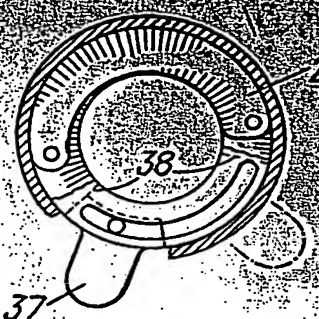

Fig. 3

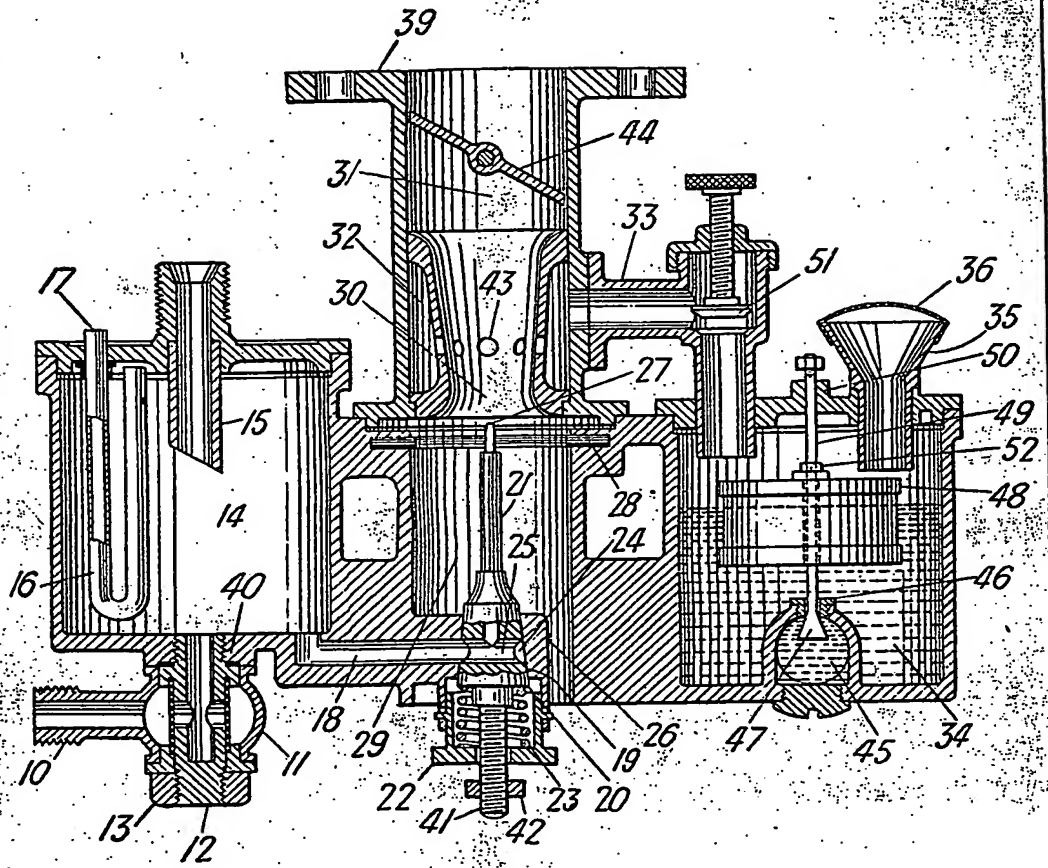

Fig. 1